

A NEW SPECIES AND TAXONOMIC NOTES ON
GENTIANELLA (GENTIANACEAE)
IN SOUTH AMERICA¹

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A NEW SPECIES FROM NORTHERN PERÚ

GENTIANELLA chlorantha Pringle, sp. nov. Figs. 1, 2.

Suffrutex caulibus usque ad 2.5 dm altis, erectis, ramosis. Folia numerosa, adscendentia, elliptica, 6–8 mm longa, 1.5–2.5 mm lata, trinervia nervo medio infra anguste carinato, obtusa. Flores solitarii, subsessiles. Calyx 7.5–9.5 mm longus. Lobi calycis oblongi vel ovato-oblongi, 2.5–3.5plo longiores quam tubus, acuti vel subacuti. Corolla 14–18 mm longa, viridis, lobis obovatis circa 2.25plo longioribus quam tubo et circa 1.6plo longioribus quam latioribus, apicem versus rotundatis et eroso-undulatis. Corolla intus glabra vel sub sinibus trichomariibus paucis minutisque. Filamenta circa 5.5 mm longa. Antherae caesiaae. Ovarium stipitatum.

Subshrub with several erect or suberect stems 0.7–2.5 dm tall; most stems dividing into 2–several strongly ascending branches, with flowering and vegetative branches present simultaneously. Leaves densely spaced throughout, the older portions of the stems ringed with old leaf bases, the distal 0.5–1.5 dm densely leafy at flowering time. Leaves mostly 6–8 mm long and 1.5–2.5 mm wide, consisting of an erect, pseudopetiole portion 1–2 mm long and an ascending, elliptic to ovate-elliptic blade, prominently 3-nerved (sometimes with an additional pair of lesser nerves) with the midrib narrowly carinate below, the apex obtuse, thickened. Flowers solitary (sometimes appearing grouped when terminating 2 or 3 short branches), erect, subsessile or on peduncles less than 2 mm long. Calyx 7.5–9.5 mm long, with erect, oblong to ovate-oblong lobes 2.5–3.5 × as long as the tube, subacute to acute. Corolla 14–18 mm long, green throughout, with the lobes obovate, ca 2.25 × as long as the tube and ca 1.6 × as long as wide, distally rounded, erose-undulate. Interior corolla surface glabrous or with a very few inconspicuous trichomes below the sinuses. Stamens inserted at ca 0.67 × the length of the corolla tube; filaments ca 5.5 mm long; anthers bluish. Ovary stipitate.

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TYPE COLLECTION: PERÚ. AMAZONAS. Bagua: Cordillera Colán NE of La Peca, ca 10,400 ft, humid pajonal, *Barbour 3439* (HOLOTYPE: MO; ISOTYPE: HAM). Known only from the type collection.

Previous authors have recognized an excessive number of species of *Gentianella* (formerly treated as a subgenus of *Gentiana*) from much of Perú. Macbride in 1959 reduced many specific names to synonymy, and further reduction has occurred subsequently (Pringle 1981). However, when Gilg's (1916) and Macbride's (1959) publications were written, few specimens from the Departamento de Amazonas were available. In view of the relatively restricted ranges of many of the Andean species of *Gentianella*, newly discovered species from this part of Perú are hardly surprising. *Gentianella chlorantha* appears to be relatively closely related to *G. radicata* (Griseb.) Pringle, which was described from specimens collected in the mountains above Lima. *Gentianella chlorantha* differs from *G. radicata* in its fewer and larger flowers; in its green corollas (white or pale

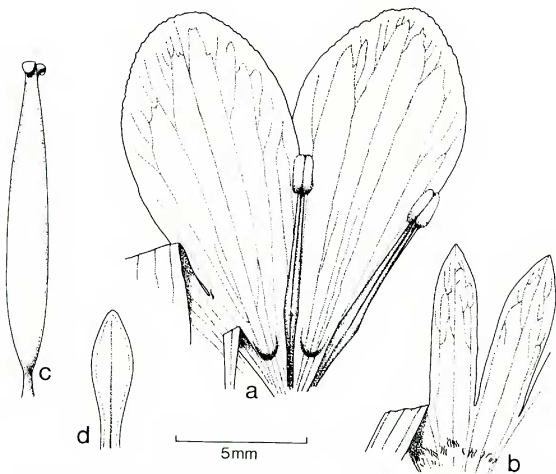


Fig. 1. *Gentianella chlorantha*. a, portion of corolla, interior surface, and stamens; b, portion of calyx, exterior surface; c, pistil; d, leaf.

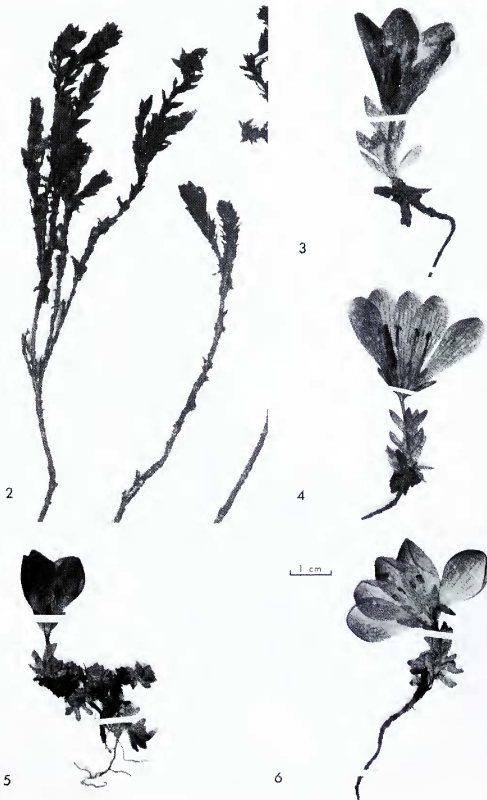


Fig. 2. *Gentianella chlorantha*, portion of holotype (MO). Figs. 3–6. Small plants of *Gentianella* spp. from Antisana, Ecuador. Figs. 4 and 6 pressed with corollas spread out to show lobe shape. Figs. 3–4. *G. cerastioides*, Asplund 17330 (S). Figs. 5–6. *G. rupicola*, Asplund 17333 (S). Figs. 2–6 to same scale.

violet with deep purple veins in *G. radicata*, according to Macbride and various label data, although not well preserved in Grisebach's material ["flavae? . . . striatae"]); and in its broader, elliptic rather than linear leaves.

GENTIANELLA CERASTIOIDES and *G. RUPICOLA*

The distinctness of *Gentianella rupicola* (H. B. K.) Holub from *G. cerastioides* (H. B. K.) Fabris has been a long-persistent question. In 1916, Gilg commented that it was often difficult and sometimes impossible to determine to which of these species a specimen should be assigned. Gilg, however, felt that evidence to support the uniting of these taxa was inadequate at the time, and that the differences between the extreme (and nomenclaturally typical) forms of the respective species were much greater than would normally be acceptable within a single species. Fabris (1960) did reduce *G. rupicola* to synonymy under *G. cerastioides*, but his wording likewise indicated uncertainty.

Much of what passed as *Gentiana rupicola* in Gilg's time actually was *Gentianella cerastioides*, as indicated by his descriptions of *G. rupicola* and his citations of specimens. Very little material of true *G. rupicola* was available for study by Gilg (1896, 1916) or later by Macbride (1959) and Fabris (1960), and most of the few specimens of *G. rupicola* that they did see were of poor quality. Consequently, Macbride's description of *Gentiana rupicola*, and Fabris's concept of this species as possibly merely a high-altitude form of *G. cerastioides*, appear to have been based largely on misidentified material of *G. cerastioides*. The extensive collecting for the Flora of Ecuador project has increased by severalfold the specimens of this complex available for study, making possible a new approach to this problem. Descriptions of these species will appear in the Flora of Ecuador, but, in view of the statements made by Fabris (1960) and the wide use of his monograph, my acceptance of *G. rupicola* as a distinct species requires a more thorough discussion than would be appropriate in the Flora.

Gilg (1896, 1916), Macbride (1959), and earlier authors differentiated these species primarily on the basis of height, erectness of stems, length of internodes and pedicels, and number of flowers per stem. Their descriptions of the flowers indicated virtually no differences. In the present study, however, I found that all specimens in this group could readily be sorted into two taxa on the basis of floral characters. I also noted that those persons who collected both of these taxa in the same area consistently kept them separate, under different numbers.

A summary of the more conspicuous differences between these species is presented in Table 1. A more detailed discussion, emphasizing recognition of these species in the herbarium, appears below.

TABLE 1. Summary comparison of the more conspicuous differences between *Gentianella cerastioides* and *G. rupicola*.

CHARACTER	G. CERASTIOIDES	G. RUPICOLA
Length of flowering stem	0.5-17 (-25) cm	0.5-3 (-11) cm
Number of flowers per stem	Usually 1 or 2, occasionally up to 6	Usually 1, occasionally 2 or 3
Pedicle length	0.3-5 cm	0.1-2.5 (-4) cm
Corolla length (closed)	(14-) 17-40 mm	(14-) 17-28 mm
Position of corolla lobes	Spreading, the corolla opening widely	Incurved, the corolla scarcely opening
Shape of corolla lobes	Narrowly cuneate-obovate, not ventricose	Elliptic, somewhat ventricose
Corolla color	Usually violet or blue-violet, occasionally pink or white	Usually red (crimson to scarlet), occasionally orange, rarely yellow

Corolla color, when retained, sharply differentiates *G. rupicola* from *G. cerastioides*. In *G. rupicola*, it is usually red, often described as "crimson," "bright red," or "scarlet," occasionally orange-red, rarely yellow. In contrast, corollas of *G. cerastioides* range from pink through various shades of violet to violet-blue or white. Most corollas are medium to pale violet, although a few specimens have fairly deep blue-violet corollas. (Corollas may sometimes appear bluer when dried than when fresh, but the contrast between those of *G. rupicola* and those of *G. cerastioides* remains.) In some specimens of *G. cerastioides*, the corollas are minutely spotted. Even in ancient specimens in which corolla color is not well preserved, the corollas of *G. rupicola* appear darker and more reddish than those of *G. cerastioides*.

Corolla color is correlated with the shape of the intact corolla and with the shape of the corolla lobes (Figs. 3-6). Balls (*in sched.*) described the corollas of his B.7281 (E, K), representing true *G. rupicola*, as "long-globular in shape. The petals do not appear to open, so that the flower has always the appearance of being in rather full bud." Pressing tends to push the petals apart, but they remain incurved toward the summit. The corollas of *G. cerastioides*, in marked contrast, open widely, ranging from funnellform to nearly rotate, with outwardly flaring lobes. This characteristic is particularly well shown in photographs taken in the field (e.g., photo attached to *Raub-Hirsch E310* [F]), but is likewise indicated in the aspect of herbarium specimens.

The corolla lobes of *G. rupicola* are more or less elliptic, widest near the middle, with the margins convex nearly their full length. They are evidently almost ventricose in the fresh corolla, with the margins often being folded under when pressed. Those of *G. cerastioides* are cuneate to

spatulate-obovate, widest well above the middle. Below the widest point, they taper with straight or slightly concave margins to the base. They are not at all ventricose, and generally press flat.

Differences in habit are of limited use in distinguishing these species. *Gentianella cerastioides* does exhibit a greater range in stem length than does *G. rupicola*, and the longer stems of *G. cerastioides* are usually erect, whereas even the longest stems of *G. rupicola* are decumbent. In both species, however, specimens with very short stems (presumably from exposed habitats) are frequent. On the longer stems of *G. cerastioides*, the upper internodes are often 1–6 cm long, occasionally up to 8 cm, whereas even on the longest stems of *G. rupicola* the internodes seldom exceed 1 cm (*Sparre 15694* [S], with internodes up to 3 cm long, is an exception). On short-stemmed plants of *G. cerastioides*, all the leaves are closely spaced. Nevertheless, even on acaulescent extremes of *G. cerastioides*, such as *Mulroy 1097* (HAM) and *Sparre 15869* (S), the narrow, cuneate-obovate, flaring, pale violet corolla lobes readily identify such specimens as being *G. cerastioides*; and long-stemmed extremes of *G. rupicola*, such as *Sparre 15694*, are likewise readily identified by the broad, elliptic-obovate, incurved, red corolla lobes. In both species, the majority of the flowering stems bear but one flower; in *G. cerastioides*, stems bearing up to five flowers are not unusual, but in *G. rupicola*, even three-flowered stems are rare. Pedicel length is highly variable in both species, but ranges to a greater maximum in *G. cerastioides*.

The altitudinal ranges of the two species overlap considerably, ca 3150–4500 m for *G. cerastioides*, and ca 3650–4600 m for *G. rupicola*. *Gentianella cerastioides* has the greater geographic range, from the Departamento de Nariño in southern Colombia to the Departamento de Azuay in southern Ecuador. *Gentianella rupicola* is known only from Ecuador, from Pichincha to Chimborazo.

My count (Pringle 1981) of $2n = 18$ for *G. cerastioides* was obtained from a specimen of *G. cerastioides* s. str., as delimited in the present study.

HYBRIDIZATION IN ECUADOREAN GENTIANELLA

Twenty-five species of *Gentianella* are native to Ecuador (Pringle, ms. for Flora of Ecuador). Most grow in páramo habitats ca 2800 to ca 4500 m altitude in the Andes, and several have large, open, blue-violet to rose-violet corollas that presumably attract similar pollinators. To date, no interspecific hybrids have been reported. Botanical exploration for the Flora of Ecuador with detailed locality data has for the first time clearly indicated the existence of hybridization in *Gentianella* in South America. Two

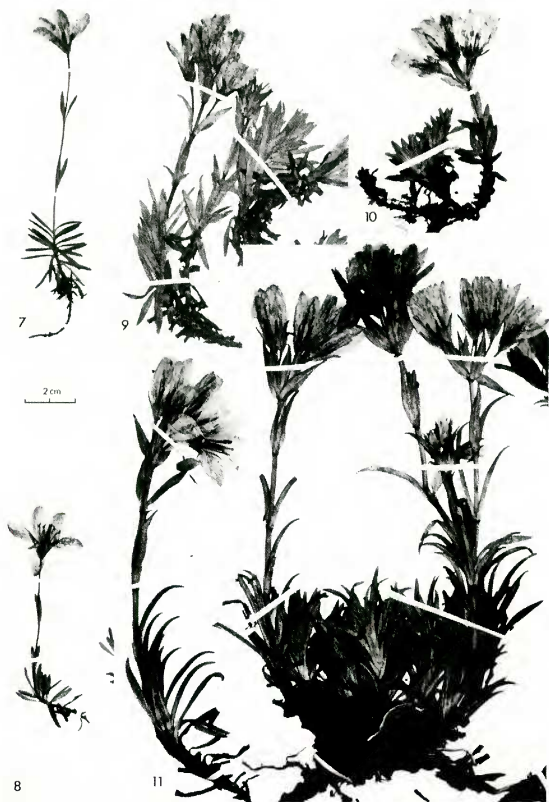
hybrids are described below. Descriptions of the parental species have been published by Fabris (1960) and will appear, with further details, in the Flora of Ecuador.

GENTIANELLA CERASTIOIDES (H.B.K.) Fabris \times *G. FOLIOSA* (H.B.K.) Fabris. Figs. 7–11. *Gentianella foliosa*, like *G. cerastioides* (above), is widely distributed at high altitudes in Ecuador and is well represented in herbaria. Both species have corollas similar in size and color.

A series of specimens at AAU, all from "Volcán Iliniza, NE slope below the refugio, lee side of loma with bunchgrass and shrubs, alt. 4300 m," Prov. Pichincha, Ecuador, evidently represents hybridization between these two species. *Holm-Nielsen et al.* 24956 and 24971 are, respectively typical specimens of *G. cerastioides* and *G. foliosa*. *Holm-Nielsen et al.* 24957 (Fig. 10) is similar in habit to *G. cerastioides*, but has 5 flowers per stem, on stems ca 6 cm tall, more flowers than is usual on plants of *G. cerastioides* of that size, and has relatively short, stout pedicels like those of *G. foliosa*. The flowers are similar in aspect to those of *G. foliosa*, having the relatively abruptly rounded corolla lobes of that species, and the leaves are somewhat wider and more lanceolate than is usual in *G. cerastioides*. Intermediacy is even more evident in *Holm-Nielsen et al.* 24964 (Fig. 9), which is similar in habit to 24957 but has stems 8–11 cm tall, bearing up to 6 flowers. The upper leaves are distinctly lanceolate, representative dimensions being 22 mm long, 5 mm wide, i.e., similar in shape to those of *G. foliosa* but in the size range characteristic of *G. cerastioides*. Some show a tendency toward arcuate spreading, as in *G. foliosa*. The corollas are similar to those of 24957.

GENTIANELLA FOLIOSA \times *G. SULPHUREA* (Gilg) Fabris. Figs. 11–13, Table 2. *Gentianella sulphurea* has a much more restricted distribution than the other two species discussed here. Only 5 collections besides those mentioned below, all from the central part of the Ecuadorean Andes, have been encountered in my studies. Although *G. sulphurea* differs strikingly from *G. foliosa* in its leaf shape, corolla color, and lack of corolla trichomes, and usually also in its stature and pedicel length, the close relationship between these species was noted by Gilg (1896) and Fabris (1960). The two species are similar in habit, inflorescence type, and size and shape of the corolla, except that the corolla lobes of *G. sulphurea* are proportionately wider than those of *G. foliosa*.

A series of 16 specimens at AAU, all from páramo habitats in the Cordillera de los Llanganates, from points 3 km SW to 13 km NW of Cerro Hermoso, Prov. Tungurahua, clearly represents a large hybrid swarm. Included are specimens representative of *G. foliosa* and *G. sulphurea*, intermediate specimens closer to each of the parental species, and specimens about



Figs. 7–11. *Gentianella* from Volcán Iliniza, Ecuador, all to same scale. Figs. 7–8. *G. cerastioides*, Weydahl 323 (S). Figs. 9–10. *G. cerastioides* × *G. foliosa*, Holm-Nielsen et al. 24964 (AAU) and 24957 (AAU), respectively. Fig. 11. *G. foliosa*, Holm-Nielsen et al. 24971 (AAU).

midway between the parental species in morphology. Several intermediate specimens are compared with the parental species in Table 2. One of the most clearly intermediate plants, as indicated by its description in the table, is illustrated in Fig. 12. Descriptions of the parental species are based on all specimens examined for the Flora of Ecuador, exclusive of a few anomalous individuals assigned to *G. foliosa*. Collection numbers are those of Holm-Nielsen & Jaramillo.

Detached flowers in packets were examined for internal corolla pubescence in two intermediate specimens, nos. 28168 and 28189, in both of which the corollas were yellow with red suffusions. The former bore tufts of trichomes below the corolla sinuses, more restricted and shorter than those of *G. foliosa*, but thus differed from *G. sulphurea*, in which corolla trichomes are absent or occasionally few and minute. In 28189, the corolla trichomes were more numerous and longer, the plant in this respect being more like *G. foliosa* although otherwise bearing a greater resemblance to *G. sulphurea*.

Hybridization may also account for some of the anomalous specimens obviously allied to *G. foliosa* that have been grouped as *G. stellarioides* (Griseb.) Fabris. Fabris (1960) described this "species" as "bastante polimorfa" even though he thus identified only 9 specimens representing perhaps as few as 5 collections. In particular, a specimen collected by Jameson on the "snowy summit of the Andes," Ecuador (S), differs from typical *G. foliosa* in having much longer pedicels (2.5–9 cm), more deeply lobed corollas, and narrower, less abruptly tapering corolla lobes, suggesting that its origin might be *G. foliosa* × *G. rapunculoides* (Willd. ex Schultes) Pringle. Jameson's labels, however, do not provide precise locality data or otherwise indicate which specimens were found in proximity to one another.

NOMENCLATORIAL TRANSFERS

Although most students of the Gentianaceae now accept generic status for *Gentianella* Moench, they have wisely refrained from making "automatic transfers" for all of the South American taxa accepted as *Gentiana* spp. by Gilg (1916) or Macbride (1959). The following species, however, appear from my own studies and from a monograph of the Argentine Gentianaceae by Fabris (1953) to be taxonomically acceptable, and the combinations published here are required for specimens sent to me for identification, for discussion in the present paper, or for use in works by other authors.

Combinations herein attributed to "Fabris ex Pringle" were proposed by H. A. Fabris, as seen *in sched.* on specimens in AAU, E, and WIS.

HYBRIDS

CHARACTER	G. FOLIOSA	28676 (closer to G. FOLIOSA)	28115	28120	28168	28189 (closer to G. SULPHUREA)	G. SULPHUREA
length 3rd internode below terminal in- florescence on longest stem	15-40 mm	40 mm	22 mm	19 mm	9 mm	15 mm	3-10 mm
length this internode/ length subtending leaves	0.6-1.5	1.1	0.77	0.79	0.34	0.56	0.1-0.7
shape of lower leaves	oblong-oblanccolate	oblong	elliptic-obovate	elliptic	elliptic	elliptic-obovate	elliptic-obovate
shape of upper leaves	ovate-lanceolate	elliptic-oblong	elliptic	elliptic	elliptic	elliptic	elliptic
length largest leaf	20-80 mm	43 mm	30 mm	27 mm	23 mm	23 mm	8-23 mm
length/width largest leaf	5-12	6.1	2.8	3.3	3.3	3.3	2-4
number of flowers in terminal inflorescences	3-21	6-9	5-7	2-6	4-7	2-6	1-2 (-6)
pedicel lengths	8-40 mm	14-21 mm	9-15 mm	15-21 mm	7-14 mm	10-17 mm	5-12 mm
corolla color (from labels)	rose-violet to blue-violet	violet	light violet	pink to red	yellow with red veins and margins	yellow at base pale red above red above	yellowish-green to yellow, rarely with red suffusion
length/width repre- sentative corolla lobe	1.6-2.4	1.7	1.5	1.7	1.4	1.4	1.2-1.5

TABLE 2. Comparison of selected specimens of *Gentianella foliosa* × *G. sulphurea* with the parental species.



Fig. 12. *Gentianella foliosa* × *G. sulphurea*, Cordillera de los Llanganates, Ecuador, Holm-Nielsen & Jaramillo 28115 (AAU). Fig. 13. Representative *G. sulphurea*, Atilio, Ecuador, Harling et al. 6663 (HAM).

GENTIANELLA cuspidata (Griseb.) Pringle, comb. nov. *Gentiana cuspidata* Griseb., Gen. Sp. Gent. 224. 1838 ["1839"], basionym, non *Gentiana cuspidata* Wallich ex C. B. Clarke, J. Linn. Soc. Bot. 14:45. 1875.

According to Macbride (1959), *Gentiana cuspidata* Griseb. "Seems to be the same as *G. multicaulis* (G. Don) Gilg, non Griseb., i.e. *G. Pavonii* Griseb., and then the earlier name" [authors' names added]. Examination of the respective type collections, however, indicates that *G. cuspidata* differs from *G. pavonii* in the greater size of the plants, more diffuse inflorescences, larger flowers, and widely opening corollas, and presents a very different general aspect. Type collection, *G. cuspidata*: PERU (not more precisely located): *Dombey s.n.*, holotype: P, and isotypes: NY(2)! On *G. pavonii*, see Pringle (1981).

GENTIANELLA dianthoides (H.B.K.) Fabris ex Pringle, comb. nov. *Gentiana dianthoides* H.B.K., Nov. Gen. Sp. 3:170 (quarto ed.). 1819, basionym.

GENTIANELLA dielsiana (Gilg) Pringle, comb. nov. *Gentiana dielsiana* Gilg, Bot. Jahrb. Syst. 22:316. 1896, basionym.

GENTIANELLA dolichopoda (Gilg) Pringle, comb. nov. *Gentiana dolichopoda* Gilg, Bot. Jahrb. Syst. 54(Beibl. 118):36. 1916, basionym.

GENTIANELLA gilgiana (Reimers) Fabris ex Pringle, comb. nov. *Gentiana gilgiana* Reimers, Bot. Jahrb. Syst. 62:326. 1928 ["1929"], basionym.

GENTIANELLA helianthemoides (Gilg) Pringle, comb. nov. *Gentiana helianthemoides* Gilg, Bot. Jahrb. Syst. 22:321. 1896, basionym.

This species was described from the Provincia de Salta, Argentina. A recent collection from the adjacent Departamento de Tarija, Bolivia, is the first for that country. Voucher specimen: BOLIVIA. Mendez: Tarija 25 kms hacia Camargo, 2765 m, 35° degrees E, Beck 843 (LPB).

GENTIANELLA mendocina (Gilg) Pringle, comb. nov. *Gentiana mendocina* Gilg, Bot. Jahrb. Syst. 54(Beibl. 118):36. 1916, basionym.

GENTIANELLA persquarrosa (Reimers) Pringle, comb. nov. *Gentiana persquarrosa* Reimers, Bot. Jahrb. Syst. 62:332. 1929, basionym.

GENTIANELLA radicata (Griseb.) Pringle, comb. nov. *Gentiana radicata* Griseb., Gen. Sp. Gent. p. 29. 1838 ["1839"], basionym.

GENTIANELLA riojae (Gilg) Fabris ex Pringle, comb. nov. *Gentiana riojae* Gilg, Bot. Jahrb. Syst. 22:319. 1896, basionym.

GENTIANELLA vaginalis (Griseb.) Pringle, comb. nov. *Gentiana vaginalis* Griseb., Gen. Sp. Gent. p. 215. 1838 ["1839"], basionym.

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